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THE PHILIPPINE ISLANDS



SUGAR INDUSTRY
PANAMA PACIFIC
INTERNATIONAL EXPOSITION
SN. FRANCISCO CALIFORNIA

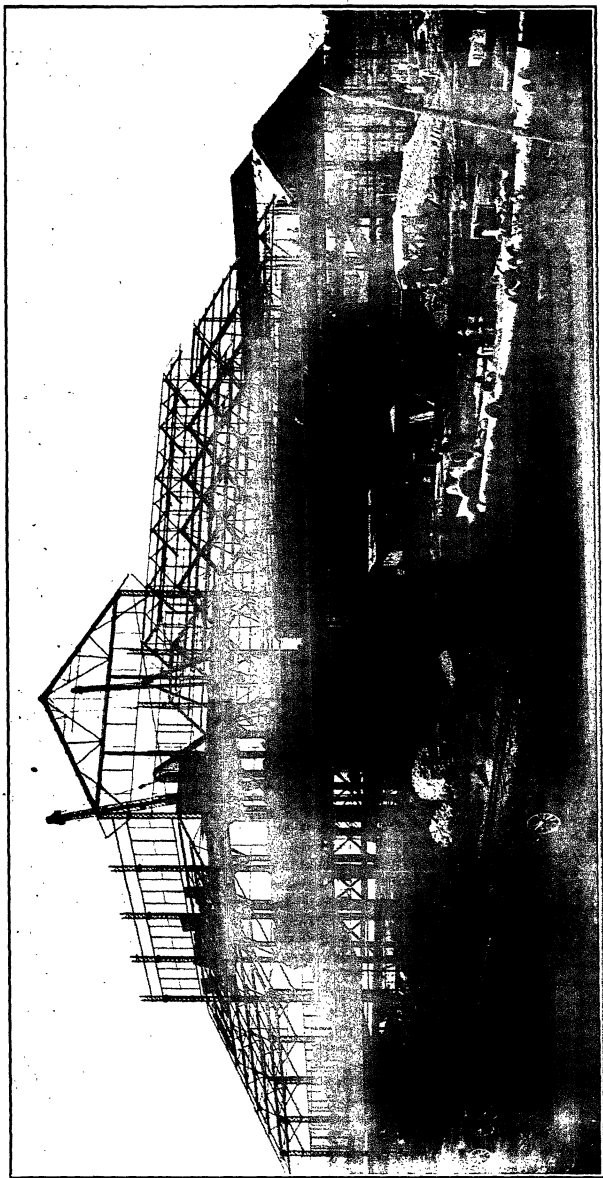
History of the industry.—Sugar cane has been grown in the Philippine Islands for a great many years. It was probably introduced from Formosa by the Chinese, but no definite record has been found to prove this point, except that the implements and methods employed are the same as those used by the Chinese in other countries. In some localities the massive granite rolls imported from China are used to this day. These are set vertically, two or three in a line, and serve to extract the juice from the cane.

The “pílon,” or earthen jar, used for packing the sugar is extensively employed for sugar exported to China, or used by the Chinese merchants of Manila.

When Magellan discovered the Islands in 1521, he found a sugar industry existing on a small scale. Different writers from time to time have also mentioned the existence of this industry.

It was probably first carried on in the island of Luzon with crude Chinese methods, and as the export trade in sugar increased, it was extended to other islands. In the year 1795 we have the first authentic record of this product. At this time some 296,219 pounds of Philippine crude sugar were exported from the Islands to the United States. Finally the Island of Negros became the center of sugar production because of its special adaptability to the industry. In the year 1854 the sugar exports from the Philippines exceeded 47,000 tons and constituted 33 per cent of the total exports. From this time until 1890 the industry gradually increased in importance until the average annual export for the four following years amounted to 200,000 tons with a value of \$7,534,838.

Muscovado sugars, called “mat sugars,” were largely made previous to this time, and these were readily disposed of the world over. Later there was a demand for a better grade of crude sugar which necessitated modern methods of manufacture. Most



Calamba sugar factory at Calamba, P. I., built in 1913, has a daily capacity of 1,200 tons of cane or 150 tons of sugar.

of the sugar-producing countries met this demand by the introduction of machinery and methods for the making of centrifugal sugars. The Philippines, however, have been slower to make these changes, so that to-day many old native factories still exist in the rich cane lands in the different sugar districts of the Islands.

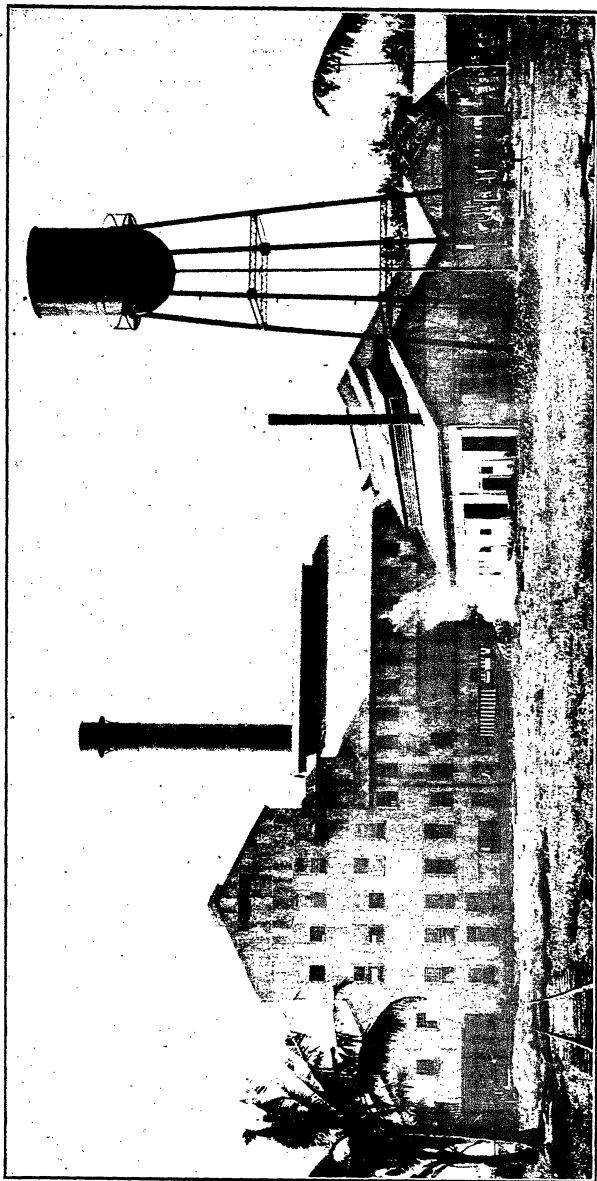
About eight years ago the first factory for the output of centrifugal sugar was built. This was found to be a great success, and the product turned out was in such demand that there are now 15 of these factories with a total daily capacity of 4,500 tons of cane, or 500 tons of sugar. The last addition to this list of factories was a strictly modern plant equipped to handle 1,200 tons of cane per day.

There is also one refinery operating here which turns out some five grades of sugars. These are largely made from crude Philippine sugars. On this account the factory should be considered a "refining plant" in the truest sense of the word, since the fine granulated sugar manufactured compares very favorably with that made by the refineries using centrifugal sugars in the United States and Europe.

Varieties of sugar cane.—There are five or six varieties of native cane growing in different sections of the Islands. These are of various colors including yellow, green, pink, red, and one that is almost black.

In recent years, the Bureau of Agriculture has introduced more than 40 improved varieties from various sugar-producing countries. Many of these canes have proved to be far superior to the native varieties and give a heavier yield of sucrose and tonnage. They are more firm and better prepared to resist windstorms, insect pests, etc. Yet the Filipino planters have been slow to plant these varieties since they are more difficult to mill in small factories.

Soil preparation, planting, harvesting, etc.—The soil is made ready for this crop by plowing and cross plowing until it is well broken up. Then disks and



San Carlos sugar factory on the Island of Negros, P. I., with a daily capacity of 800 tons of cane or 100 tons of sugar.

harrowers are used until the seed bed is in good condition. The native method, which is practiced to this day on many of the small plantations, is to use a wooden plow and a wooden harrow for this work. These implements are drawn by a carabao (water buffalo). On the larger modern estates, however, steam or gasoline power is used and the modern implements serve to loosen the soil to a much greater depth than is possible with the old methods.

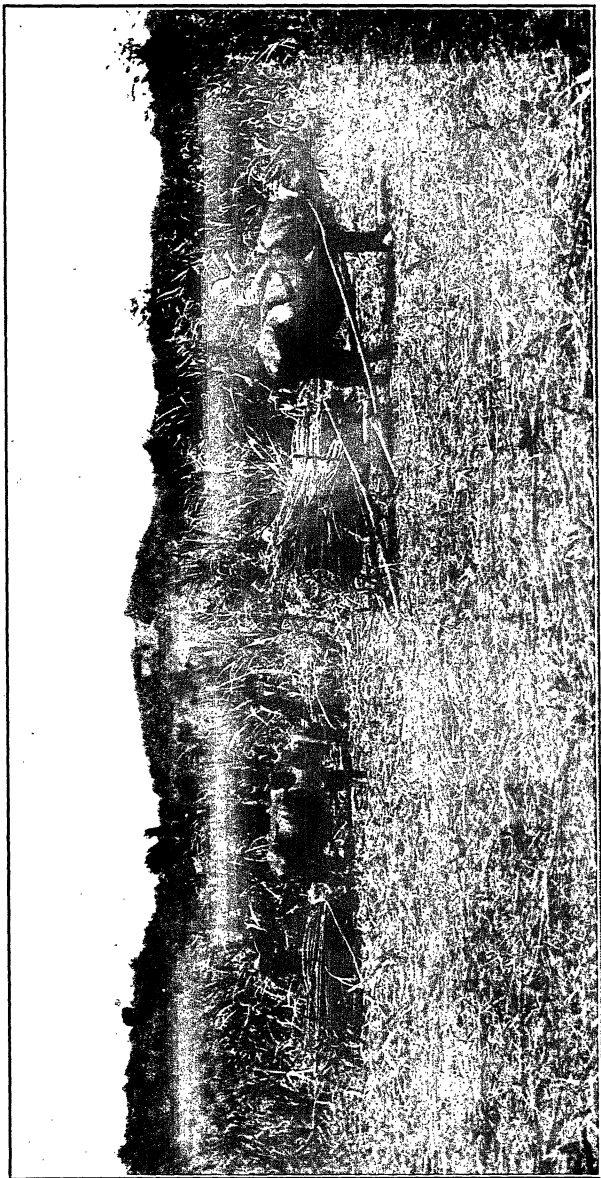
Planting is usually started early in December and



"Yellow Caledonia" sugar cane imported from the Hawaiian Islands.

continues for some five months. This work is necessarily done at the time of harvest, since the top joints of the cane which are yet immature are used for planting. These pieces are cut in lengths of 6 or 8 inches and after receiving a preliminary soaking of one or two days in running water, they are planted in rows usually 6 feet apart.

Hand labor is used exclusively in harvesting the crop. The leaves are stripped from the stalk and the top is removed, after which the stalks are cut down and placed in piles for transportation to the factory.



Native method of transporting sugar cane in the Philippines.

Various methods are used for the transportation of the cane and sugar on the plantations, but the modern factories employ narrow-gauge tracks and locomotives. These have given universal satisfaction wherever the amount of cane produced is great enough to warrant such an expenditure.

Method used in making crude sugar.—The method of clarification used for the making of Philippine low-grade sugars is very crude and inefficient. The juice from the mill is passed to the first kettle. Here air-slaked lime mixed with a little water or juice is added, and a fire is built underneath. When boiling begins, some of the light impurities come to the top and are removed. The juice is then dipped to the second kettle where evaporation is continued. From the second, it is passed to the third, and from the third to the fourth. Usually four, but occasionally five, kettles are all that are used. In every case the juice is dipped from one to the next as the water boils away, until the last is reached, where final concentration is made.

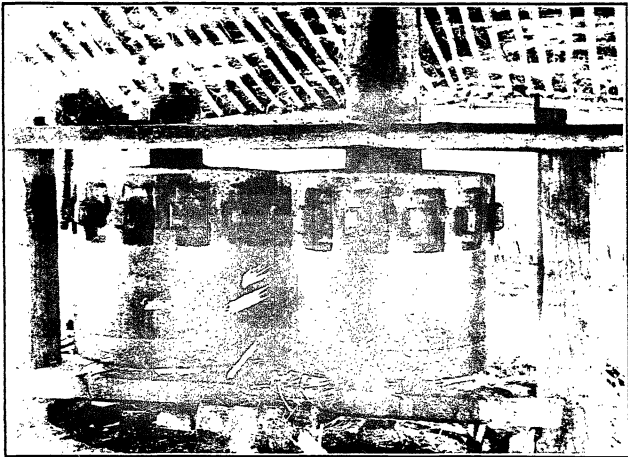
When the heavy sugar solution has been boiled to the proper consistency so that it will begin to crystallize during the cooling, it is dipped into one of the earthen jars, known as "pilón," or placed in a wide shallow box and stirred until it becomes crystallized. In this case it will be placed in mat bags called "bayones."

Grades of sugars.—Many grades of sugars are found in the markets of the Philippine Islands. First may be mentioned "pilón" sugar. The jars which receive these sugars are bell-shaped and are usually about 18 inches in diameter at the top, by about 24 inches high, and contain from 100 to 140 pounds of sugar. They have a hole 2 inches in diameter at the bottom to let the molasses drain away from the crystals.

Pieces of "bagasse," or cane fiber, are first placed over the hole in the bottom, to prevent the hot "mas-

secuite," or sugar solution, from running through. The pilón is then either set over another smaller jar or over a trough to catch the molasses that drains from the hole. Pilonos are left dripping in this manner for six or eight months or until they are to be marketed.

The pilón sugar as it comes from the "hacienda"¹ is of three classes. The first is from the top of the pilón. This contains little molasses and has fairly good crystals. The second, from the middle,



Old granite rolls used in extracting juice from sugar cane.

is of a lower grade, and the third, from the bottom, is very poor and contains much molasses. When this sugar is used by the local refinery, the low grade is separated from the better and is given a special treatment of clarification.

A great deal of this pilón sugar is used by the Chinese in Manila for making a semirefined lump sugar called "caramelo." The crude process of refining begins before the sugar is removed from the earthen jars. A layer of clay is first applied over

¹ Plantation.

the top and is kept soaked with water, which tends to wash away the molasses adhering to the crystals, and also to bleach the sugar. The better portions of the sugar are then separated and dissolved. The sirup is clarified with lime and albumin of eggs and finally recrystallized during constant stirring. This sugar is cut into slices of about $\frac{1}{2}$ by 2 by 3 inches while still hot, and is used as a coffee sugar by the Filipinos.

The bulk of Philippine sugar exported at present is of the "mat" sugar type. It is so called from the fact that the containers are sacks made of a kind of mat from the leaves of the buri palm.

This sugar is made in identically the same way as pilón sugar up to the time that it is dipped from the kettles, when it is placed in large shallow boxes and immediately stirred until crystallized. It is then cooled and placed in the "mat" bags, reinforced by a piece of rattan. Each of these bags holds about 40 pounds of sugar.

There is a great difference in the grade of even these crude sugars. This is caused by the difference in the condition of the juice from which they are made as well as by the method of clarification and boiling. They are usually classed in different grades as follows:

No. 1, which polarizes from 87° or above.

No. 2, which polarizes from 85° to 86.9° .

No. 3, which polarizes from 82° to 84.9° .

No. 4, which polarizes from 80° to 81.9° .

No. 5, which polarizes from 76° to 79.9° .

Sometimes No. 6 or "corriente" is made which is a very low grade of black molasses sugar.

About one-fifth of the local consumption of sugar is in the form of sugar cakes called "panochas." These cakes are made of crude sugar molded in half-shells of coconuts. They vary from 1 to 2 pounds in weight and are consumed very generally throughout the Islands.

The centrifugal factories usually make 96° test sugar to be used in a refinery where it is afterwards melted and made into granulated sugar. However, several factories have recently produced very good yellow clarified crystals for local consumption by the sulphurous-acid and the phosphorous-acid methods.

Experiments with the cane juices here have demonstrated that high-grade plantation sugars may readily be made with a minimum of expense on account of the high purities of the juices. There is



Native sugar factory of the Philippine Islands.

no doubt but that the modern factories will soon adopt a system to supply not only the best grade of sugars consumed here, but also a large portion of the crop for export.

Labor.—The labor situation in the Philippines is much the same as that found in other tropical countries. Since practically all the industries here are carried on by the use of hand labor, there is usually a scarcity of labor at harvest time which is also the time of planting the new crop. The larger factories now being built employ every labor-

saving device possible. While this arrangement minimizes the personnel required for the factory, yet the cutting and planting is all done by hand. The latter is accomplished by women and children who receive from 20 to 25 cents per day.

Transportation.—Transportation throughout the Philippine Islands has been very much improved since American occupation by the building of railroads and macadamized roads, yet the transportation to many of the rich cane lands is still quite poor.

In some sections there are rivers over which the sugar may be floated in small boats to the sea where it is loaded upon the larger ships. There are few places where sugar may be loaded directly upon large ocean liners. One great difficulty experienced in many sections is the necessity of first loading the sugar on lighters for shipment to the large steamers, since there is usually very shallow water for some distance from the shore.

Land available for sugar cane.—There were about 435,200 acres of land under cultivation in sugar cane in 1913. This represents but about one-half of the land suitable for this crop.

When modern apparatus and methods are universally employed here, much of the uncultivated land will probably be utilized for this crop as well as a portion of the land now used for other purposes.

Sugar legislation.—In 1902 Congress passed a law admitting Philippine products into the United States under a duty reduction of 25 per cent. It was presumed that such legislation would bring about great improvement in the sugar industry. However, this did not succeed in attracting outside capital for the development of the industry.

In the year 1909, the Payne-Aldrich bill was enacted which offered material relief to the situation.

This provided free entry into the United States each year for an amount of sugar not to exceed 300,000 tons. The duty on sugars imported into the

United States from foreign countries at that time was \$1.66½ per 100 pounds of 96° test sugar, consequently the effect of the law was to greatly stimulate the sugar industry of the Islands. Prior to the passage of this law most of the export sugar went to China. In the year 1910, 94,000 tons of sugar went to the United States, while in 1911 seven-eighths of the total amount exported was sent there.

The latest tariff legislation, known as the "Underwood Bill," provides for the gradual reduction of the tariff on sugars imported from foreign countries until the year 1916 at which time sugar is to be placed on the free list. Philippine sugars are now admitted free of duty to the United States, irrespective of amount.

Export of sugar.—By far the greater portion of the sugar exported from the Philippines belongs to the higher grades of "mat" sugars which are on a par with the centrifugal "seconds" of the United States. Nearly all of the centrifugal sugar produced in the Islands is also exported, there being little local demand for it at present. The growth of the sugar exports may be seen in the following table:

Exports of sugar

Fiscal years.	Quantity.	Value.	Average value per ton.	Percentage of total exports.
	<i>Long tons.</i>	<i>Dollars.</i>	<i>Dollars.</i>	
1905.....	111,845	4,977,026	44.50	13.4
1906.....	123,807	4,863,865	39.29	14.8
1907.....	118,389	3,934,460	33.23	11.5
1908.....	149,316	5,664,666	37.94	17.2
1909.....	110,605	4,373,338	39.54	14.0
1910.....	125,700	7,040,690	56.01	17.6
1911.....	147,017	8,014,360	54.51	20.1
1912.....	183,078	10,400,575	56.81	20.6
1913.....	209,183	9,491,540	45.37	17.8

It will be noted that the export for 1913 was the largest ever reported, but on account of the low

prices that year it brought less income to the Islands than the smaller export of 1912.

The countries to which sugar was exported and the amount of such exports during the fiscal years 1912 and 1913 were as follows:

Exports of sugar—by countries

Countries.	Fiscal year 1912.		Fiscal year 1913.	
	Quantity.	Value.	Quantity.	Value.
	<i>Long tons.</i>	<i>Dollars.</i>	<i>Long tons.</i>	<i>Dollars.</i>
United States	159,227	9,142,833	82,625	3,989,665
United Kingdom	8,336	561,300		
China	3,995	164,805	35,310	1,577,424
Hongkong	7,655	351,603	49,924	2,137,415
Japan	3,860	179,745	41,313	1,786,396
British East India	2	139	10	640
Guam	2	150		
Total	183,077	10,400,575	209,182	9,491,540

Production.—The total production of sugar in the Islands is about 100,000 tons in excess of the export. In other words, that amount is consumed locally in various forms. During the fiscal year 1913 the reported production was 308,107 long tons. The sugar locally consumed consists of about 80,000 tons of “pilon” and “mat” sugars, and 20,000 tons of “panochas.”

Future prospects.—Present indications point to rapid improvement in cultural methods, milling, and refining processes in the sugar industry throughout the Islands. Since the sugar lands are so located as to warrant the construction of modern mills at many different central points, it is anticipated that in the near future additional mills of such type will be constructed. The pioneer factories already in existence have invariably been successful when suitably located with respect to districts of heavy production.

The maximum yields of sugar in the Philippine Islands have never been obtained on a large scale,

but with the favorable climatic conditions, rich soils, and possibilities for irrigation in many sections, there is no reason why equal if not even greater yields might be expected than those of the fertile lands of Hawaii, when modern methods are employed.

Further information on this subject may be obtained from the director-general of the Philippine Exposition Board, Panama-Pacific Exposition, or by application to the Director of Agriculture, Manila, P. I.

